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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,128	01/17/2006	Tatsuo Shimizu	06.22.01.P	7793

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EXAMINER	
BARROW, AMANDA J	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,128	SHIMIZU ET AL.	
	Examiner	Art Unit	
	AMANDA BARROW	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) *2,3,7 and 9* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-6,8 and 10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

1. The Applicant's amendment filed on 1/6/2010 was received. Claims 1, 8 and 10 were amended.

2. The texts of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on 9/4/2009

Claim Rejections - 35 USC § 112

3. The claim rejection on 35 U.S.C. 112, second paragraph on claim 10 is withdrawn because the claim has been amended.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The claim recites that the current collecting substrate is formed on the surface of the electrode active material which is not found in the specification. The specification teaches the

carbon material and electrode active material formed on the current collecting substrate, but not the other way around as claimed. Appropriate correction is required.

For compact prosecution purposes, the claimed material will be examined as it appears in the specification (the electrode active material is formed on the current collecting substrate).

6. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites that the, "carbon material has a higher density near the current collecting substrate and a lower density in an upper region." It is not clear to the Examiner where the "upper region" is located. Appropriate correction is required.

Furthermore, it is unclear whether the density referred to in the claim refers to the density of the actual material or the overall density (packing density) of all of the carbon material. The specification notes that the density is the "void percentage" and thus it is clear that what is meant is the packing density/void percentage/porosity. Appropriate correction is required.

For purposes of compact prosecution, the Examiner will examine the claims reading the density as the void percentage of the carbon material.

7. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites that the electrode material has a density less than or equal to 1.4 grams per cubic centimeter in an upper region. It is not clear to the Examiner where the "upper region" is located. Appropriate correction is required.

Furthermore, it is unclear whether the density referred to in the claim refers to the density of the actual material or the overall density (packing density) of all of the carbon material. The specification notes that the density is the "void percentage" and thus it is clear that what is meant is the packing density/void percentage/porosity. Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The claim rejections under 35 U.S.C. 102(b) as being anticipated by Tajima et al. on claims 1, 4, 6, 8 and 10 are withdrawn as the claims have been amended.

Claim Rejections - 35 USC § 103

9. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Tarver et al. in view of Nakai et al. on claim 5 is withdrawn as the claims have been amended.

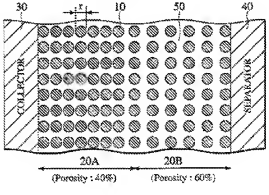
10. Claims 1, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (JP Patent Application 62235704 (Patent Number JP401081167A) in view of Tanjo (US Patent Application 2002/0028380).

Regarding claim 1, Tajima discloses a charge collector/electrode ("current collecting structure") that includes a conductive substrate ("current collecting substrate") that has a carbon material directly deposited on the conductive substrate ("current collecting substrate") without

the use of binders (see abstract). Tajima discloses that the invention pertains to a battery having a high energy density and longer cycle life (abstract).

Tajima does not disclose the density of the carbon material on the current collecting substrate; however, Tanjo discloses analogous art of a battery having a high power and energy density (paragraph 12). Tanjo discloses a collector 30 with an active material layer 20 containing the positive electrode active material (paragraph 44). Tanjo teaches that the active material layer 20 may have a plurality of active material layers having different porosities (paragraph 51). The electrode may have a two layer structure in which the layer closer to the separator 20B ("the upper region") has a porosity larger than the active material layer 20A closer to the collector. In other words, the active material has a higher density/lower void percentage in the area near the current collector 30 than in the area closer to the separator ("upper region"). This is illustrated below in Figure 3:

FIG.3



Tanjo teaches that the amount of the electrolytic solution 50 in the vicinity of the separator 40 can be increased and the migration power of lithium ion can be increased by making the porosity of the active material layer 20B adjacent to the separator 40 large. Moreover, a

usage rate of the active material 10 in the vicinity of the collector 30 can be increased by making the porosity in the vicinity of the collector 30 small. Thus, the power density can be effectively increased by balancing the diffusion in the positive electrode active material 10 and the migration in the electrolytic solution 50. Since the energy density is influenced by an average porosity and the active material amount of the active material layer 20, the power density can be increased without sacrificing the energy density by appropriately adjusting the average porosity and the amount of the active material (paragraph 51).

Therefore, it would have been obvious to a person of ordinary skill in the art to modify the active material layer of Tajima to have a higher density/lower void percentage near the collector as compared to the "upper region" near the separator because Tanjo teaches such a configuration (Figure 3) and that this allows for an increase in migration power of the lithium ion and an increased usage rate of the active material in the vicinity of the collector which effectively increases the power density (paragraph 51).

Regarding claim 4, Tajima discloses that a charge carrier capable of reversible intercalation and deintercalation ("electrode active material") is supported on the carbon material deposited on the substrate (see abstract).

Regarding claim 6, Tajima discloses that the electrode is to be used in a battery (see abstract above).

12. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. (JP Patent Application 62235704 (Patent Number JP401081167A) in view of Tanjo (US Patent Application 2002/0028380).

Regarding claim 8, Tajima discloses a charge collector/electrode that includes a conductive substrate ("current collecting substrate") that has a carbon material ("electrode active material") directly deposited on the conductive substrate ("current collecting substrate") without the use of binders (see abstract above). Tajima discloses that the invention pertains to a battery having a high energy density and longer cycle life (abstract).

Tajima does not disclose the density of the carbon material on the current collecting substrate; however, Tanjo discloses analogous art of a battery having a high power and energy density (paragraph 12). Tanjo discloses a collector 30 with an active material layer 20 containing the positive electrode active material (paragraph 44). Tanjo teaches that the active material layer 20 may have a plurality of active material layers having different porosities (paragraph 51). The electrode may have a two layer structure in which the layer closer to the separator 20B ("the upper region") has a porosity larger than the active material layer 20A closer to the collector. In other words, the active material has a higher density/lower void percentage in the area near the current collector 30 than in the area closer to the separator ("upper region").

Tanjo teaches that the amount of the electrolytic solution 50 in the vicinity of the separator 40 can be increased and the migration power of lithium ion can be increased by making the porosity of the active material layer 20B adjacent to the separator 40 ("upper region") large. Moreover, a usage rate of the active material 10 in the vicinity of the collector 30 can be

increased by making the porosity in the vicinity of the collector 30 small. Thus, the power density can be effectively increased by balancing the diffusion in the positive electrode active material 10 and the migration in the electrolytic solution 50. Since the energy density is influenced by an average porosity and the active material amount of the active material layer 20, the power density can be increased without sacrificing the energy density by appropriately adjusting the average porosity and the amount of the active material (paragraph 51).

Therefore, it would have been obvious to a person of ordinary skill in the art to optimize the density/porosity/void percentage of the active material layer of Tajima to have a specific density/porosity/void percentage in active material layer 20A ("upper region") near the separator because Tanjo teaches such a configuration (Figure 3) and that this allows for an increase in migration power of the lithium ion and an increased usage rate of the active material in the vicinity of the collector which effectively increases the power density (paragraph 51). Furthermore, since the energy density is influenced by an average porosity and the active material amount of the active material layer 20, the power density can be increased without sacrificing the energy density by appropriately adjusting the average porosity and the amount of the active material (paragraph 51 - Tanjo). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.).

Regarding claim 10, Tajima discloses that a charge carrier capable of reversible intercalation and deintercalation ("conductive material") is supported on the carbon material deposited on the substrate (see abstract). Tajima disclose that the charge carrier is lithium metal

powder (oral translation by USPTO translator, Akiko Smith, page 3, upper right column line 18 through lower left column, line 1) which is a conductive material. Thus, the three components are formed on the surfaces of one another.

13. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tajima et al. in view of Tanjo et al. as applied to claims 1, 4 and 6 above and further in view of Nakai et al. (US Patent Application 2003/0122983 A1).

Regarding claim 5, Tajima discloses that the charge carrier ("electrode active material") is a lithium metal powder of about 140 mesh (105 microns) (oral translation by USPTO translator, Akiko Smith, page 3, upper right column line 18 through lower left column, line 1). Therefore, Tajima does not disclose that the electrode active material has a mean particle diameter of less than 2 microns; however, Nakai teaches that in using electrode active materials that have a small average particle diameter (0.1 to 2 microns), the reaction area of the active material is optimized therefore improving the power characteristic without enlarging the size of the battery (paragraph 13).

Therefore, it would have been obvious to a person of ordinary skill in the art to optimize the particle diameter of the electrode active material of Tajima because Nakai teaches that in using particles with small diameters (0.1 to 2 microns), the reactive area of the active material is optimized therefore improving the power characteristic without enlarging the size of the battery (paragraph 13). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.).

Response to Arguments

14. Applicant's arguments filed on 1/6/2010 with respect to the claims are moot due to the amendments made.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/
Examiner, Art Unit 1795

/Dah-Wei D. Yuan/
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